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at the Harvard Medical School October 8, 1940*

for HANS ZINSSER

Professor of Bacteriology and Immunology, 1923-1940



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Some Recollections of Hans Zinsser

ONE of the most revealing stories of Hans Zinsser I know is that of a visitor to the sombre old building of the College of Physicians and Surgeons on 49th Street in New York City. The story, as I recall it, came to me from Harvey Cushing. It was after 5 o'clock on a dark wintry afternoon when a visitor called at the janitor's office and was told that he would find Dr. Zinsser up two flights, in the last room at the end of the corridor. The visitor climbed the well-worn stairs and as he walked along the dimly lighted passageway, and neared the last room, he heard strains of music. He opened the door and saw two men in laboratory coats, the Professor of Bacteriology and his laboratory servant. The Professor was playing intently on his violin and the servant on a flute, while nearby over a Bunsen burner a pot of tea was warming. That was a scene which needs no comment.

Dr. Zinsser and I both joined the Army in 1917, as officers in the Medical Reserve Corps. Before he left for France he addressed the students at Columbia, telling them that this was the "1776" of Americans of German origin. In March, 1918, orders came for me to go to Dijon and set up a surgical research laboratory in connection with the Army's Central Medical Laboratory located there. On the evening of my arrival I found at the dingy Hôtel de la Cloche a group of officers sitting around the table after dinner. Among them was a slender, fair-haired man in uniform, whose delicate and sensitive features attracted my attention. This was my first sight of Hans Zinsser. A letter which I wrote home shortly thereafter reported, concerning the group, that "we had a long and very lively discussion about democracy, the dangers of labor control, compulsory military service, and the probable effects of war in the United States. On the various points we disagreed heartily. Zinsser proved to be a thoroughgoing believer in democracy and an excellent debater. It was almost the best conversation I have heard since coming to Europe, and I am delighted with the prospect of such company." A month later I wrote home from Dijon, "A fine friendship is springing up between Zinsser, 'Jack' Yates of Milwaukee and myself. Yates is a badger, like me; Zinsser is a New Yorker, a grandson of one of the German revolutionaries of '49 and as ardent and whole-souled an American as you could find. Both Yates and Zinsser have the same taste in jokes that I have, and the same silly appreciation

of occasional nonsense. You should hear Zinsser's story, in German dialect, of the ingenuity used by the bewildered mother to distinguish between her daughters, Mimi and Tilly, who were identical twins. 'Ven I puts my fing-er in *Mimi's* mout'—and she *bites* me—*den* (smiling triumphantly) I know it's Tilly.' Zinsser is a radical individualist, and his job in the Army is the discovery and stamping out of epidemics, a function which he much enjoys, but which lets us open holes in his individualist arguments. He and Yates have recently taken two rooms near mine and, as they happened on a piano, Yates and I have the great pleasure of listening to Zinsser's excellent playing."

A little later I wrote, "Last Thursday Yates went to Langres to lecture at the Sanitary School on chest surgery. I walked to Zinsser's room with him that evening and we had a rambling chat about the inadequacy of science for the determination of human conduct, the importance of religion, renunciation *vs.* justice, the possibility of improving mankind by ethical instruction, etc. Usually we disagreed, but that didn't matter—we had a good talk."

It was in May, 1918, when we had been in France many months, that Hans and I each received, in the same mail, letters which were remarkably similar. Each of us heard from home that as long as we were useful in France there was no wish for us to return. That was an inspiring word. Hans confessed to me that it did more to cheer him up than anything that had happened. You can readily see that we were each very dependent for our persistent morale on the attitude of the person whom Captain Yates affectionately called "friend wife."

Only once did I see Hans really incensed. That was in the summer of 1918. The German forces had been driven north from Chateau Thierry. In the mobile warfare sanitation had been neglected. At the time, the home of Mme. Huard—which she wrote about in her book "My Home in the Field of Honor"—was being used as a hospital. When I was there shortly after the fighting the flies swarmed so numerously that they blackened the beams of the kitchen ceiling; they buzzed and crawled everywhere; they wallowed in the soft butter; they dirtied the bread; they lit in the cut of the surgeon's knife. Well, Hans returned to Dijon from a survey of that region. He had found that the natural result had occurred—dreaded dysentery had made its appearance. In my letter home I wrote that he was "hot with indignation over the coolness and indifference which he encountered and the quiet assumption that sickness was to be expected." It was then that he went to work in the forward areas. Within two months he had organized

army sanitation and made sure that it was properly administered. His duties had brought him into close contact with field conditions after battle, and he told me that he was "sick at heart over the horrors of it." In the citation which accompanied the award to him of the Distinguished Service Medal, when the War had ended, are these words: "For exceptionally meritorious and distinguished services. While acting as Sanitation Inspector of the Second Army he organized, perfected and administered with extraordinary and exceptional success a plan of military sanitation and epidemic-disease control."

After Dr. Zinsser came to the Harvard Medical School in 1923 our friendship continued, though we saw relatively little of each other because each of us was immersed in exacting professional activities. I had chances to observe him in action, however, at Faculty meetings, during discussions in the Administrative Board, and as a member of special committees. He always brought to these conferences his native intelligence and insight and the wisdom he had gained from rich and various experiences during the years at Stanford, at the College of Physicians and Surgeons in New York, and in the Army. He was usually definite and firm in his ideas. He expressed himself with clearness and force. He was frank and direct without giving offense, and he invited a similar attitude from others. His sympathies were quickly and sensitively aroused. I well recall that once I sent him notice I could not attend a meeting because of a slight infection, and he promptly paid me an anxious visit. When an act occurred which seemed to him inconsiderate or unfair he did not hesitate to express his stern disapproval. If there was trouble he was kindness itself.

I last saw Hans Zinsser at the Faculty meeting in May. Our conversation led me to write him, after the meeting, a note which was intended to bring him cheer. The next day there came an answer from him that closed with these sentences: "I have settled all the emotional aspects of the situation. Moreover, I am holding my own for the time being by grace of x-rays, liver injections, etc. Meanwhile, the anticipation of death is after all not so tragic (when one faces it) as it sounds in the story books. Love to you and thanks—Hans."

Such were some of the personal characteristics of Dr. Zinsser. In his career of outreaching ventures he touched life at many points. Human beings he liked just as they came—once he sailed to the Grand Banks merely to work with a fishing crew. He was utterly free of any pretense. On occasion he could be indignant and ready for quick action. As a rule, however, he thought carefully and planned. The wide range

of his interests, his sense of humor, his skill as a musician, his exuberant spirits and infectious enthusiasm, and his warmly affectionate nature made him a delightful companion, and, to those who knew him well, one of the choicest of friends.

He devoted his abundant energies to the relief of man's estate through the advancement of his chosen science. *There* will be found the durable results of the perishable years.

“Man with his burning soul
Has but an hour of breath
To build a ship of Truth
In which his soul may sail,
Sail on the sea of death.
For death takes toll
Of beauty, courage, youth,
Of all but Truth.”

—WALTER B. CANNON

The Scientific Work of Hans Zinsser

DR. ZINSSER'S scientific work was almost wholly in the field of immunology. He was a bold and persistent pioneer investigator in this most difficult branch of biology. A clear thinker, ingenious in experimentation, he brought into clear relief fundamental phenomena in preparation for the exact analyses through chemistry and physics which he knew should and would follow. He exhibited his versatility by mastering techniques in physical chemistry in order to apply quantitative methods to his problems. He was the first to measure the size of virus particles by ultra-filtration through colloidin membranes and to attempt, with notable success, analysis of metabolic conditions in tissue cultures favorable to the cultivation of viruses and rickettsiæ. He presented a physico-chemical explanation, based on particle sizes of antigens, of the mechanism whereby a single immune body produces either the precipitin reaction or bacterial agglutination.

Intelligible exposition of Dr. Zinsser's researches with reference to their historical setting and biological importance is not feasible on this occasion. Their highly specialized nature and the associated unfamiliar nomenclature preclude the attempt, even before an audience chiefly medical.

Noted for contributions of etiological significance for syphilis, rheumatic fever, and typhus fever, he was consistently, throughout his career, an immunologist. In a list (perhaps incomplete) of 106 papers recording actual research, 70 deal with subjects in immunology; over half of these (43) are concerned with fundamental aspects of immunity; the remainder, with immunological problems of pyogenic diseases, tuberculosis, syphilis, typhus, and virus diseases.

Studies of the tuberculin reaction, published in 1921, led him to formulate a clear distinction between the allergic responses and anaphylaxis. He pointed out that the tuberculin reaction—allergic in nature—could be elicited only subsequent to a tissue reaction in the animal. Six years later, with the late Dr. Francis Grinnell, he showed how a similar type of reaction with the unaltered proteins of other bacteria could be produced.

Dr. Zinsser, in 1914, was one of the first group to study the effects of heat upon the behavior of proteins used to immunize animals, and to show that a heat-resistant fraction was concerned with the specific

nature of the immune body. His later tuberculin studies led to a generalization of first importance, applicable to responses in bacterial infection in general. The easiest way to present this generalization is to quote from his 1921 paper. "It would appear that certain non-coagulable substances of uncertain chemical constitution are being constantly elaborated in the course of bacterial growth, and passed into the circulation of infected animals. As a result of this, infected animals become sensitized to these heat- and acid-resistant materials. . . . Early in the course of infection the animal becomes sensitized and subsequently the further elaboration and distribution of these materials from the bacterial focus play a fundamental part in the injury of the animal. These proteose-like substances, like tuberculin, possessing but slight toxicity for the normal animal, become highly toxic to the sensitized one. Thus, these substances, while not being true exotoxins in the ordinary sense, would still represent a highly toxic bacterial product comparable in its injurious effect to toxins when produced in the body of an animal thus sensitized. . . .

"If there is any value in these deductions the attention of bacteriologists should be turned to the non-protein constituents of bacterial cells in their further immunological studies, as well as to the protein materials."

This generalization of Hans Zinsser's is perhaps his greatest in the field of immunology. It reflects his training in pathology and his broad understanding of the sequences that compose a disease entity.

"Residue antigens" was the name he gave to these "heat- and acid-resistant materials." He and his associates and many others confirmed and extended his observations, now of very great theoretical and practical importance in the elucidation and serum treatment of bacterial diseases. The fact that other investigators, with far greater chemical and other resources at hand, showed that the residue antigens were complex polysaccharides, in no way detracts from the credit due to Dr. Zinsser. It should cause us to reflect upon the many circumstances which impede research by chiefs of departments in universities.

For a few years (1914-1916) Dr. Zinsser devoted part of his time in attempting to cultivate *Treponema pallidum*, the cause of syphilis. Although he duplicated the apparently successful work of others, he came to the conclusion, on the basis of negative answers from immunological experiments, that virulent treponemata of syphilis had not been cultivated. This conclusion is reaffirmed in the last edition (1939) of his "Textbook of Bacteriology."

In Boston, Dr. Zinsser and his associates continued to investigate the immune reactions of greatest importance for the understanding and the serum therapy of infectious diseases. He continued to make important contributions to the study of allergy and anaphylaxis and to stimulate his associates to apply his results to the problems of specific diseases. In 1929 and 1930 he published important papers on the cultivation of viruses and on the pathology and immunological aspects of a virus disease—herpes.

Another interest—submerged since his experiences with typhus fever in Serbia in 1915—surged forward. From 1930 on, he devoted his energies and talents to the many problems concerned with endemic and epidemic typhus fevers—etiology, transmission, immunology, and epidemiology. His genius in immunology enabled him and his associates to achieve rapidly classificatory characterizations of these two types of typhus fever, of great importance for subsequent progress. The work of Dr. Zinsser and his group and that of a talented few in the United States Public Health Service, together, have been of world-wide importance and have patterned the methods of study of rickettsial diseases throughout the world. His part in locating the reservoir of endemic typhus in rodents and his work on the differentiation of the strains of typhus rickettsiæ alone entitle him to permanent renown.

He published many papers on the immunological aspects of typhus fever, but concentrated on the task of producing a practicable method of vaccination, the first requisite of which is a means of securing unlimited numbers of the causative agent—*Rickettsia prowazekii*.

From his laboratory came a satisfactory explanation of the perplexing Weil-Felix reaction—the agglutination of certain strains of *Bacillus proteus* by the blood of typhus patients. A “residue antigen” common to rickettsiæ and *Bacillus proteus* proved to be the answer.

His last success in the typhus field was the development of methods of cultivation of rickettsiæ into a procedure practicable for the mass production of vaccines for typhus fever and, incidentally, for Rocky Mountain spotted fever.

The record of Dr. Zinsser's scientific achievements becomes more impressive when we consider that it was divided into four periods in three different university medical schools, and that he saw service during the last World War and served abroad on several scientific commissions. He wrote many papers in the nature of reviews. He saw two textbooks through many editions. Probably his non-scientific literary work was in the nature of relaxation. His research work gives abun-

dant evidence of originality. His textbooks reveal his great ability in the integration of knowledge. Unlike many persons distinguished for research, he was always interested in the practical application of his work and published many papers of importance on public health topics as related to civilian populations, and as applied for military purposes.

The courage he exhibited in setting forth his views on medical education is also revealed in his commitments to startling conclusions on the bases of his own work. He was an early proponent of the unitarian view in regard to antibodies. He published his convictions that Brill's disease (sporadic typhus fever) represents the recrudescence of European typhus fever, long latent in the individual. His conclusion that allergy to streptococcus infection is responsible for the manifestations of rheumatic fever likewise expressed his complete reliance on the accuracy of his own work.

His scientific foresight was shown early in his career by his successful efforts to secure the application of exact chemical and quantitative methods to immune reactions.

It has not been possible to mention many highly technical contributions by Dr. Zinsser which are now important elements in the structure of immunology. He was one of the great leaders in the creation of a science of major importance in the study of living things in health and in disease.

—S. BURT WOLBACH

Hans Zinsser, A Teacher of Bacteriology

YOU have heard of the life and high attainments of Dr. Zinsser. I wish to say a few words in behalf of all the undergraduates that Dr. Zinsser taught, students in California, at Columbia, and here at Harvard.

Our first contact with him here at the Medical School was in our second year. Bacteriology was part of the curriculum. Under Dr. Zinsser this was no mere dull quota of work, but an education in itself. Under his enthusiastic and dynamic teaching, many of us realized for the first time the larger problems of immunology, the complex and fascinating interactions between the host and the invading organisms. Dr. Zinsser was a thorough teacher. True to the Germanic traditions of his family, he made sure that we learned our lessons. If it required hard work at times to master the details of such a broad field, it was none the less essential that we do so, if we were to become well-rounded physicians. Under him we did learn them, but that was the least part of what he gave us.

He had the unusual ability to create the will to learn, to stimulate in his students the drive that has carried many of them on to positions of responsibility in many parts of the world. In his life we find the answer, perhaps, to the highest function of the teacher, for is it not well known that all education is self-education in the last analysis? It is not by precept but by example and encouragement that men are taught, and it was Dr. Zinsser's great gift to be able to share and to impart his enthusiasm to his students. Under him many of us first seriously considered a life in the laboratory, a life where learning for its own sake is the focal point. Although this has been impossible to many of us, still that vision and desire is something we have carried away with us, something that in many instances has affected our whole lives.

Dr. Zinsser had many sides. If he was more than a bacteriologist in being an immunologist, with all the wide connotations of that latter word, so he was more than a scientist. If he was Germanic in his work, then he was Gallic in his relaxation. Warm-hearted and generous, he loved a good time and pleasant company. The whole broad field of knowledge appealed to him, philosophy, literature, and poetry especially. It was his blending of science with the fine arts, with the hunting field,

and with people that made him so akin to the humanists of the Renaissance. I have heard him say that bacteriology was the finest of the indoor sports, amplifying this by saying that it had enabled him to travel widely all over Europe and the Orient, to meet many interesting people, all in the pursuit of his profession, all the while providing him at home with the quiet life of his laboratory and family here in Boston.

This is the vision that he gave to us, his students. From him we learned to think of the laboratory as connoting a free and fascinating life, not a mere workshop for a science.

When we heard that Dr. Zinsser was ill, and that he would soon teach us no more, we were stunned. But it was perhaps as much in death as in life that he influenced many of us, his last classes. To see him facing his shortening days with unbelievable *sang froid*, making them some of his most effective, was the ultimate demonstration of the strength of his spirit. It made us realize what a privilege it had been to work and to study under such a man.

So it is at this time, and in his own amphitheatre, in behalf of all those men whose lives were enriched by knowing him, and in behalf of those students whose very lives were changed by the contagion of his enthusiasm, that I wish to pay our respects to Dr. Zinsser.

—WILLIAM F. LOOMIS, Class of 1941

Hans Zinsser in the Laboratory

VARIOUS were the attributes of Hans Zinsser's luminous mind and spirit. In thinking of him today, some of you see him as a great teacher, others as a distinguished investigator, many as a perspicuous and sensitive commentator on science, letters, education, and on his own and others' lives. An increasing number recognize in him a poet of great emotional intensity. But a comparatively small group of us—possibly the most fortunate of all—were with him in the laboratory. We were his friends, and with him shared the task. I am the inexpert spokesman for these privileged people.

I want to speak mostly of him as head of the laboratory; to depict as best I can some of those qualities of mind and heart which enabled him to fashion that office into a remarkable instrument whereby not merely bacteriology and immunology were advanced, but the lives of those who came to him were broadened and enriched. It is a truism which cannot be too often repeated that no man can arouse the enthusiasm of others and lead them into the delights of his chosen paths unless he himself burns with the fires of devotion. In Hans Zinsser this flame burned with an extraordinary brilliance and, like a beacon, attracted others from all over the earth. For more than three decades, and until the very last, he was in the laboratory every day and frequently at night. And he was there because he could not stay away. The problem of the moment absorbed him completely. It broke his sleep and dragged him willy-nilly to his experimental animals and his cultures. Its progress, as he has said, largely governed his mood, which was either "*himmelhoch jauchzend*" or "*zum Tode betrübt*," depending on the success or failure of his experiments. He has himself told us how he looked upon his work: "There is in this profession," he says, "a fascination . . . which holds the spirit with feelings that are not exaggerated by the word 'passion'; indeed, like the happiest personal passions, it feeds on the intimate daily association of long years and grows, like love, with an increasing familiarity that never becomes complete knowledge. For what can be more happily exciting than to study a disease in all its natural manifestations . . .?"

But this is not the only, nor perhaps the most significant, aspect of his attitude toward his profession, for many—according to their natures and capacities—are thus enslaved. His gallant and imaginative spirit

saw in scientific research high adventure. The investigation of infectious disease became for him a field of battle. Always loving and even often seeking out a struggle where benevolent causes were at stake, this lifelong conflict with the agents of syphilis, tuberculosis, typhus, and the rest—which he regarded perhaps only half humorously as sentient malignities—satisfied in large part his need for dangerous experience in the pursuit of generous ends. Those who surrounded him were set alight and newly energized by this flaming idealism.

Also, we followed and loved him because of his complete lack of cant and his hatred of any trace of academic affectation and professional posing. This came, I am sure, not only from his own good sense—which he had in abundant measure—but also from his essential modesty and true humbleness of mind. More than most, he was aware of the broad lacunae in the knowledge of every man today, even in his own science. This made him eager to learn wherever he could. In a Cambridge undergraduate, a first year medical student, in a hostler, a fisherman, or a Whitehead, he first saw a human being whom he possibly might help in some way, and then a source of information. With these purposes in mind, one cannot for long preserve the professorial manner.

But the extent of his general knowledge was sufficient to furnish forth respectably two or three professors' chairs. The world of letters only recently has become aware of his broad cultivation, but for us it was an old and delightful story. For some years we all lunched together in the laboratory. As we ate, the conversation—led by him—became animated. Literature, politics, history, and science—all he discussed with spontaneity and without self-consciousness. Everything was illuminated by an apt allusion drawn from the most diverse sources, or by a witty tale. Voltaire seemed just around the corner, and Laurence Sterne upon the stair. Here, indeed, was a liberal education to be gained pleasantly, while one dined.

Under such influences, the laboratory became much more than just a place to work and teach; it became a way of life. I have seen younger men of considerable knowledge but little wisdom, still marked by lingering traces of adolescence, on coming here change almost suddenly into mature people aware of the infinite possibilities of existence. Often, he also brought about a rapid maturation of their latent capacities as independent investigators through his deep wisdom in allowing those who showed some promise much freedom in working out their problems. Though always ready to help the neophyte with advice or a

happy suggestion, he not only permitted him every opportunity for self-dependence, but subtly urged him to develop his own powers to the top of his bent. Upon another he was seldom tempted to impose either his own ideas or his own will, for he believed profoundly in the doctrine of intellectual and spiritual democracy, according to which it is the duty of the individual to follow to the end the beckonings of his own best genius.

But more important still, "the Professor," as we affectionately called him, became the friend of those who gathered about him. What he wrote of his colleague, Oscar Teague, is in double measure characteristic of himself: ". . . no one can know with exactitude the number of those who were helped by him—according to their needs. His mind, his heart, and, if need be, his purse were open and accessible to those who needed them, and he is mourned—with us—by many a laboratory boy and technician who has had Teague's hand on his shoulder at a difficult time." Constantly the quick sympathy of Hans Zinsser's friendly and affectionate nature expressed itself in acts of helpfulness.

And, finally, shining out above all was his courage. Of his character, this was the very essence. Always he sought the hazardous task, the dangerous place—not without fear, for he confessed to being sometimes terribly afraid—but because he knew that in its conquest was strength and peace.

And so it would seem that all his life he was preparing himself for these last two years, when he came to know that the end could not be far away. We who were with him then will ever be the better for having seen him tranquilly continuing his researches, writing his books, and teaching his students as if no term had been set. But the attainment of this inward calm was not as easy as he would have us believe from what he has written. As the weeks and months passed, I know that it took the full measure of his brave soul to preserve it. Deeply we miss him, here in this place, and mourn the irreparable loss of his companionship and counsel. Yet the memory of the manner in which he faced and met death compensates us in part. For, as a great poet has said of another who, suffering much, endured to the end:

"Nothing is here for tears, nothing to wail
Or knock the breast; no weakness, no contempt,
Dispraise or blame; nothing but well and fair,
And what may quiet us in a death so noble."

—JOHN F. ENDERS

